Clean Coal Power Initiative and a National Strategy for Clean Coal Technology Investments-A Work In Progress
by the
DOE Office of Fossil Energy dated October 2001

Introduction

This paper outlines the key role of the Clean Coal Power Initiative (CCPI) in DOE's overall strategic investment in clean coal technologies. This investment also includes a core R&D program and investment incentives that will encourage more efficient, advanced clean coal technologies to be adopted in new and existing power plants. The CCPI is a government-industry partnership investment in the demonstration and proof of operations of advanced technologies that will make clean coal more competitive, thereby providing the Nation with a reliable, affordable, secure and sustainable supply of electricity. CCPI responds to the President's commitment to clean coal technology as part of his National Energy Policy.

CCPI Linkages to National Energy Policy (NEP) and Authorizing Legislation

Concerning elements 2 and 3 above, the NEP (page 5-15) recommends that the President direct the Department of Energy to continue to develop advanced clean coal technology by:

- Investing "$2 billion over 10 years to fund research in clean coal technologies."
- Supporting a permanent extension of the existing R&D tax credit.
- Directing agencies to explore regulatory approaches that will encourage advancements in environmental technology.

The energy bill passed by the House in August (H.R. 4, Securing America's Future Energy Act) provides $2 billion over 10 years for element 2 above (Section 5005). In addition, Section 3117 of H.R. 4 provides financial and other incentives for early commercial plants using advanced clean coal technologies. Section 3117 authorizes an estimated $3.3 billion over 10 years as an incentive for investing in qualifying, advanced clean coal facilities. These incentives would reduce the technology, operating, and market risks associated with early commercial plants using advanced clean coal systems. Concerning the core R&D program, element 1 above, Sections 2401, 2462, and 2481 authorize $200 to $300 million per year for coal and related technologies R&D programs.

CCPI Demonstrations

CCPI demonstrations will bridge the "gap" between DOE's ongoing clean coal R&D program and deployable advanced systems for commercial power generation. Demonstrations will include, for example, systems comprising advanced turbine, fuel cell, and gasification technologies that will be required in the long-term for clean coal applications.

Early CCPI demonstrations will emphasize advanced technologies that are applicable to the existing fleet of power plants and will also include construction of new advanced clean coal power plants. Technologies selected for demonstration will:

- Be applicable to a significant portion of the coal-fired power generation industry.

- Not have previously been proven in commercial settings and/or broadly used by electrical power generators.

In implementing the CCPI, DOE will ensure that Federal funds are used only for projects that would not be undertaken by industry on their own. DOE will implement the CCPI demonstration element using cost-shared partnerships which leverage government dollars and maximize the impact of appropriated resources.

The table below summarizes the three elements of the clean coal technology investment strategy:

Clean Coal Investment Strategy			
Program Element	**Core R&D Program** →	**CCPI Demonstrations** →	**Financial & Other Incentives**
Budget	~$230 million / year	$2 billion over 10 years or ~$200 million / year	$3.3 billion over 10 years or ~$300 million / year
Focus	- Efficient power generation - Reduction of all pollutants	- Demonstration of initial Commercial-scale units - Systems integration	- Construction and operation of early commercial plants
Funding mechanism	- Cooperative Agreements - 20% minimum cost sharing	- Cooperative Agreements - 50 % minimum cost sharing	- Tax credits (investment and production) - Financial incentives (e.g., rate subsidies, performance guarantees, risk pools, revolving funds)

It is important that the CCPI demonstration element and the proposed commercialization incentives included in H.R. 4 are complementary, not duplicative. Through its Office of Congressional Affairs, DOE will advocate that any final energy bill emerging from Congress utilizes a diverse and appropriate set of incentives. In addition to tax credits, the commercialization incentives could include several targeted financial tools. Eligibility criteria need to be established that are both challenging and consistent with market-forces and need to stimulate advanced, clean and efficient technologies rather than “off-the-shelf” systems. These criteria should also serve to build confidence in the new technology's technical, environmental and economic performance, thus readying them for subsequent commercial use.

Clean Coal Technology Investment Rationale

- The CCPI and integrated investment strategy evidences a commitment to clean coal that is part of a broader strategy to address U.S. and global energy needs by providing the marketplace with a broader slate of low-cost, environmentally friendly technology options to achieve a diverse energy mix.

- The incentive package is needed to accelerate commercial introduction of a broader set of clean coal technologies and systems. Without commercialization and commercial use of clean coal technologies and systems, the goals of increased electricity and reduced emissions using coal cannot be met.

- The incentive package is targeted at helping the power generation industry manage the critical risks of cost competitiveness, unscheduled downtime, and market penalties associated with failure to deliver power. These risks are at their highest as new technologies and systems approach the commercial marketplace. It also provides a stimulus for developing and using advanced technologies having improved environmental performance.

Potential Environmental Benefits

In addition to the reduction of pollutants, the CCPI and investment strategy could result in significant reductions in carbon emissions.

- The CCPI would offer an opportunity to develop and demonstrate technologies in response to emerging interests in a "multi-pollutant control" strategy. Several proposals have been offered in response to the Administration's recommendation in the NEP for a flexible, three-pollutant control strategy that would target emissions of NOx, SO_2, and mercury from coal-fired power plants. These proposals call for significant reductions in the three pollutants to be phased in over the next 10-15 years.

- Improving power plant efficiencies is a very effective way of reducing pollutant and carbon emissions. Early CCPI power generation technologies may be as much as 20% more efficient than the current fleet (average efficiency--33%). This enhanced efficiency would lead to a 17% reduction of carbon emissions on a per plant basis. Advanced CCPI technologies will push efficiencies toward the 60% range (80% in co-production applications).

- Carbon sequestration has the potential of providing a near zero emission option that utilizes an abundant, domestic fuel. The base coal R&D program is developing low cost, carbon sequestration technologies. Demonstrating and validating these technologies could enable emissions from 2020 vintage plants to approach zero.

- On a national basis, DOE's coal initiatives could greatly reduce the 500 million metric tons of carbon emitted annually by the Nation's fleet of coal-fired power plants. A 1% improvement in average fleet efficiency saves 14 million metric tons of carbon emissions per year. One 400-MW plant operating at 40%

efficiency saves 132,000 metric tons of carbon per year compared to a 400-MW plant operating at today's fleet average efficiency of 33%. If all plants achieved 40% efficiency, the Nation would save 81 million metrics tons of carbon emissions each year.

- One 400-MW plant at 60% efficiency saves 350,000 metric tons of carbon per year compared to the fleet average. If all coal plants went to 60% efficiency, carbon emissions would be reduced 215 million metric tons per year. Carbon sequestration technologies applied at the power plant could capture 90% or more of the remaining carbon emissions.

- The CCPI and investment strategy responds to the directions set forth in the National Energy Policy that recognize the benefits to this country's economy, as well energy security, that are associated with the use of clean coal technologies in satisfying part of our energy supply needs now, and well into the future.

Calendar for CCPI Demonstrations (status)

August-Early September: Developed plans for "open" CCPI Workshop for distribution to industry and external stakeholders in advance of the September 28 meeting.

September 28: Held an initial public workshop with industry groups, environmental organizations, and others to:

1. Begin a Government/industry dialog to determine industry and government's respective roles in assuring the continuing competitiveness of coal while meeting environmental requirements.
2. Discuss the permanent structure for involvement by relevant industry sectors (e.g., equipment and systems vendors, power generators, coal producers, unions, transporters, environmental organizations, and financial institutions) and other stakeholders in the CCPI.
3. Seek input on the technical focus and major implementation aspects of the FY 2002 CCPI solicitation.
4. Seek input on financial incentive strategies including those outlined in H.R. 4.
5. Review the core coal R&D program activities for consistency with demonstrations and financial incentives.

October:	Post "proceedings" from the September Workshop on the NETL website (www.netl.doe.gov).
October-January:	Develop working draft comprehensive CCPI and investment strategy incorporating stakeholder inputs.
December:	Issue draft initial CCPI demonstration solicitation.
January:	Comments on FY 2002 solicitation draft due.
February:	Issue FY 2002 solicitation.
February-April:	Conduct series of regional industry and stakeholder meetings to obtain views on draft comprehensive CCPI (DOE/stakeholders).
April/July:	Receive demonstration project applications responding to FY 2002 solicitation for demonstration projects.
May:	Release final clean coal investment strategy document.
July-December:	Review and Select initial demonstration projects.

Process

- Hold a public workshop on September 28 with interested stakeholders (now completed). The purpose of the meeting is to provide an opportunity for the private sector, the environmental community, and others to submit views on the longer-term content and structure of the President's initiative, help define the focus of the initial demonstration solicitation, and seek input on targeting coal investment financial strategies. Attachment A provides the agenda used for this meeting.

- Develop a strategy for how government and industry will work together to achieve the goal of ensuring the competitiveness of coal without compromising environmental objectives. A cooperative effort with the private sector to implement the President's initiative is proposed, including extensive co-funding and possible use of consortia to structure and implement the program. Private sector involvement will likely come from coal producers, power generators, transporters, equipment and systems vendors, unions, financial institutions, and others. Extensive involvement of environmental groups will be a high priority. The input gathered at the Workshop and from follow-up interactions will be used to structure a "strawperson" for working with the private sector.

- DOE intends to extend its longstanding partnership approach to technology development by seeking formal recommendations regarding the CCPI and investment strategy design from the private sector. Input will be sought from a broad spectrum of senior level officials from the coal and power industries, along with state agencies, environmental organizations, and other relevant groups in the private sector as part of resolving the final management approach.

    - DOE will consider the recommendations and outcome of the initial public workshop to develop:

    1) A management mechanism to help guide and track the future course of the clean coal technology effort and investment strategy.

    2) A draft solicitation, which would be issued with comments due in December 2001. A final solicitation would be issued in February 2002.

    3) An initial draft of a multi-year investment strategy that incorporates inputs received from the workshop. A series of regional industry meetings to obtain final views on the draft plan and management structure (DOE/stakeholders), culminating in the release of a final long-term plan by May 2002.

Clean Coal Investment Strategy Faces Tradeoffs in Policy Options

The Administration and Congress face tradeoffs in balancing competing approaches within the goals of the energy bill and the NEP:

Clean Coal Tradeoffs	Broad Tax Credits (ITC+Prod'n)	Tight Tax Credits (ITC+Prod'n)
Strategy with only tax credits	**BOX A1: Current Proposal** Use of tax credits allowed for conventional systems (9500 Btu / kWh) *and* advanced systems (8500 Btu / kWh or less). - $2.0 billion over 10 years for CCPI - $3.3 billion for tax credits **Negative Results** • Conventional plants favored: pulverized coal and fluidized bed. • Gasification RD&D undermined as tax credits are used up before IGCC is competitive. • Coal plants subsidized that would be built anyway. • No reduction in carbon emissions as more conventional coal plants are built.	**BOX A2: Modified Legislation** Tax credits applicable only to systems with heat rates under 8500 Btu / kWh (or >40% efficiency) and scaled based on efficiency achieved. **Positive Results** • Favors more advanced systems. • Conventional plants still built because of lower capital costs, despite not qualifying for tax credits. • Progress on CO2 emissions in longer term through better efficiency and gas cleanup.
Strategy *with broad* Financial Tools • Performance guarantees / risk pool • Futures contracts • Revolving loans • Rate subsidies • Debt / equity structures	**BOX B1: Conflicting Incentives** Use of tax credits for both conventional systems and advanced systems. Financial tools could reinforce poor choices when utilized on conventional units. **Negative Results** • Conventional plants favored. • Gasification RD&D undermined. • No reduction in carbon emissions as more conventional coal plants are built. • Intensified pressure from environmental groups and foreign governments on CO2 reductions.	**BOX B2: Innovative Finance** Tax credits and financial incentives applicable only to advanced systems, reinforcing move to advanced systems. Production credits used in tandem with risk pool and other tools to offset faulty designs. **BEST Results** • Acceleration of Clean Coal technology deployment. • Broader array of system options financed; more leverage. • Faster progress on CO2 emissions reduction as more efficient units replace aging plants.

Attachment A
Clean Coal Power Initiative (CCPI)
Planning Workshop Agenda

Hyatt Regency
Pittsburgh International Airport
September 28, 2001

9:00 – 10:00 a.m.
Registration
Continental Breakfast

10:00 – 10:30
General Richard L. Lawson (RET)
Former President of the
National Mining Association

- Assuring a Role for Coal in America's Future
- Overcoming Barriers to Coal Use
- Government Role / Industry Role

10:30 – 11:00
"Opening Remarks"
Bob Kripowicz
United States Department of Energy

- National Energy Plan
- Challenges & Opportunities
- FE Approach to Meet Challenges & Opportunities
- Need for Active Industry Involvement
- Desired Outcome from CCPI Investments

11:00 – 11:30
"CCPI"
Rita Bajura, Director
National Energy Technology Laboratory, US DOE

- Overview of DOE Coal R&D
- Benefits of Past Investments in RD&D
- CCPI Integration (R&D, Demonstrations, and Incentives)
- Options for the CCPI Demonstration
- Introduce Topics for Afternoon Workshops

12:00-1:00
GROUP LUNCH

1:00 – 3:15
"Breakout Sessions"
Facilitated By DOE Representatives

- *Identify CCPI Issues & Concerns*
- *Provide Suggestions*

Technology	***Markets & Business***	***Regulatory***	***Management***
What Technologies Should Be Addressed in RD&D Programs	**What Draws Industry to Be Involved in Demos; What Does It Takes to Get a Technology Broadly Deployed**	**How Do Regulations Drive and Constrain RD&D and Deployments**	**What Management Structure Will Maximize Benefits to Nation**
➢ Near or Long Term ➢ Carbon Reduction/Elimination ➢ Generation Efficiency ➢ Retrofit and Powering ➢ Brownfield/Greenfield ➢ Reliability and Capacity ➢ Infrastructure Improvements	➢ Incentives ➢ Teaming ➢ Repayment ➢ Financing Options ➢ Industry Participation	➢ Public Needs and Benefits ➢ Regulatory Constraints ➢ Control Technology (e.g., mercury) ➢ By-Product Management ➢ Water Usage ➢ Emissions Trading	➢ Industry & Association Involvement Guideline Development ➢ Program Implementation and Management Approaches

Cross-cutting Theme: Finance

3:15 – 3:30
"Session Reports & Next Steps"
Carl Bauer